

**REMARKS:**

The Examiner rejected claims 1, 3, 4, 5, 8, 9, 11, 12, 13 and 16 under 35 U.S.C. §103(a) as being unpatentable over Ying et al. (U.S. Patent Publication No. 2004/0079977) in view of Applicant's admitted prior art (hereafter referred to as "APA"). The Examiner rejected claims 7 and 15 under 35 U.S.C. §103(a) as being unpatentable over Ying et al. in view of APA and further in view of Janesick (U.S. Patent No. 6,909,126). The Examiner rejected claims 6, 14, 17, 18 and 20 under 35 U.S.C. §103(a) as being unpatentable over Ying et al. in view of APA and further in view of Zhao et al. (U.S. Patent No. 6,727,946). The Examiner rejected claim 19 under 35 U.S.C. §103(a) as being unpatentable over Ying et al. in view of APA and Zhao et al. and further in view of Janesick. These rejections are respectfully disagreed with and are traversed below.

**RESPONSE TO EXAMINER'S RESPONSE**

On page 2 of the Final Office Action, the Examiner asserts that "Ying suggests multiple embodiments of the variable capacitive load" and cites the variable number of legs Ying et al. describe (para. [0026] of Ying et al.). It is submitted that these are simply variations on a single design – that of having a transistor and a capacitor connected in parallel with the photodiode (see para. [0021], [0025] and [0026] of Ying et al.). Ying et al. do not disclose or suggest any mechanism other than having a transistor and a capacitor connected in parallel with the photodiode to implement variable conversion gain.

Independent claim 1 of the instant application recites in part; "where said first amplifier circuit is comprised of a Charge Transimpedance Amplifier (CTIA) input circuit, and where said second amplifier circuit is comprised of a Source Follower per Detector (SFD) input circuit." That is, the readout circuit unit cell claimed by claim 1 is configurable to form *two distinct amplifier circuits*, namely a CTIA input circuit and a SFD input circuit.

As support for consideration of and distinguishing between a CTIA input circuit and a SFD input

circuit, reference is made to commonly-assigned U.S. Patent No. 6,642,496 to Gulbransen, attached hereto as Exhibit A (12 pp.). Note that FIG. 3B depicts a SFD circuit while FIG. 3C shows a CTIA circuit. Furthermore, specific reference may be made to col. 4, line 62-col. 5, line 12 (SFD circuit) and col. 5, lines 13-24 (CTIA circuit). Exhibit A also states that: "Each unit cell 10A of the array 10 of FIG. 2 is assumed to include one of the illustrated circuits [of FIGS. 3A, 3B and 3C], and the gain of each circuit is adjusted by varying the value of at least one capacitance within the unit cell 10A."

While Ying et al. state that the conversion gain for the pixel can be changed in response to different thresholds of light intensity (para. [0026]), Ying et al. do not disclose or suggest that such variable conversion gain can be obtained by *distinct amplifier circuits*, such as a CTIA input circuit and a SFD input circuit. Since the disclosure of Ying et al. is only focused on variations of one type of variable conversion gain circuit (transistor/capacitor legs in parallel with the photodiode), Ying et al. cannot be seen to disclose or suggest the subject matter recited in claim 1 of the instant application.

On page 3 of the Final Office Action, the Examiner further argues: "The claims [do] not recite any specific way of connecting [the plurality of capacitances, switches and transistors] shown in figures 2 and 3 of applicant's specification." The Applicant respectfully disagrees with this statement. FIGS. 2 and 3 of the instant application illustrate an exemplary embodiment of the invention configured as a CTIA circuit and as a SFD circuit, respectively. As noted above, independent claim 1 specifically recites that "said first amplifier circuit is comprised of a [CTIA] input circuit" and "said second amplifier circuit is comprised of a [SFD] input circuit." Therefore, claim 1 recites specific ways for connecting the plurality of capacitances, switches and transistors. Since Ying et al. do not disclose obtaining a variable conversion gain by programming a plurality of capacitances, switches and transistors to attain *two distinct amplifier circuits*, and, more specifically, to attain a CTIA input circuit and a SFD input circuit, Ying et al., in conjunction with the APA, cannot be seen to disclose or suggest the subject matter recited in claim 1.

**INDEPENDENT CLAIMS 1, 9 AND 17**

Ying et al. disclose an image sensor pixel having variable conversion gain. See Abstract. Specifically, Ying et al. disclose the use of a variable capacitive load 202 (see FIGS. 2B and 4) connected in parallel (see Abstract) with the photodiode 105 of a prior art pixel 101 (see FIG. 1).

**Ying et al. do not disclose or suggest the use or application of any other mechanism to implement variable conversion gain** (i.e., other than a variable capacitive load connected in parallel with the photodiode of a pixel).

The APA comprises statements made in the Background Section of the instant application. Therein, the Applicant notes that conventional readout circuit amplifier types include a high gain amplifier type known as CTIA and a lower gain amplifier type known as SFD. See Gulbransen. The Applicant also identifies several commonly-assigned U.S. patents relating to these two types. The Applicant further notes that the wide dynamic range requirement has been approached, in a conventional readout circuit, by using a single circuit type, such as the CTIA, that is configured to have two or more distinct gains and variable integration times. See para. [0004] of the instant application.

In contrast, the instant application discloses the use of a configurable (i.e., programmable) unit cell that can be formed into two distinct circuits: a Charge Transimpedance Amplifier (CTIA) input circuit and a Source Follower per Detector (SFD) input circuit. The difference between these two circuits comprises much more than merely varying a capacitance load. One of ordinary skill in the art at the time the invention was made would readily appreciate the notable differences between FIG. 2 (CTIA circuit) and FIG. 3 (SFD circuit) in the instant application, as evidenced by Gulbransen.

Furthermore, it would not have been obvious to one of ordinary skill in the art to combine Ying et al. and the APA as suggested by the Examiner. See p. 4 of the Office Action.

MPEP §2141 states:

Office policy is to follow *Graham v. John Deere Co.* in the consideration and determination of obviousness under 35 U.S.C. 103. As quoted above, the four factual inquiries enunciated therein as a background for determining obviousness are as follows:

- (A) Determining the scope and contents of the prior art;
- (B) Ascertaining the differences between the prior art and the claims in issue;
- (C) Resolving the level of ordinary skill in the pertinent art; and
- (D) Evaluating evidence of secondary considerations.

Considering the APA, and considering the Ying et al. reference as a whole, it would not have been obvious to one of ordinary skill in the art at the time the invention was made to combine them so as to arrive at a teaching that could be seen to disclose or suggest the claimed subject matter. Ying et al. do not suggest the desirability of using any variable conversion gain technique other than transistor/capacitor legs in parallel with the photodiode. In fact, Ying et al. do not refer to or discuss any other amplifier circuits, let alone CTIA circuits or SFD circuits. Any suggestion that the alleged combination of Ying et al. and the APA would be obvious is the product of impermissible hindsight vision afforded by the claimed invention and cannot serve as the basis for rejecting the claims under §103.

MPEP §2141.02 states:

In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious.

It is submitted that the claimed invention would not have been obvious to one of ordinary skill in the art at the time the invention was made in light of Ying et al. and the APA. While Ying et al. disclose the use of a variable capacitance load in order to solve the proposed problem, Ying et al.

do not disclose or suggest any other amplifier circuits besides transistor/capacitor legs in parallel with the photodiode. In contrast, the instant application discloses the use of a configurable unit cell that can be formed into a CTIA input circuit and a SFD input circuit. The disclosure by Ying et al. of a plurality of transistor/capacitor legs certainly cannot be seen to read on the use of a configurable unit cell that can form a CTIA circuit and a SFD circuit.

The features recited in claim 1 are not disclosed or suggested in the cited art. Ying et al. in view of the APA certainly does not render claim 1 obvious. Therefore, claim 1 is patentable and should be allowed.

Though dependent claims 3-8 contain their own allowable subject matter, these claims should at least be allowable due to their dependence from allowable claim 1.

Independent claims 9 and 17 claim a similar feature as claim 1 noted above, including "A method to operate a readout circuit unit cell with a radiation detector... where said first amplifier circuit is comprised of a Charge Transimpedance Amplifier (CTIA) input circuit, and where said second amplifier circuit is comprised of a Source Follower per Detector (SFD) input circuit" (claim 9) and "A readout circuit unit cell for use with an infrared (IR) radiation detector... to form, in a first mode of operation below an illumination level threshold, a CTIA input circuit, and to form, in a second mode of operation above the illumination level threshold, a lower gain SFD input circuit" (claim 17). For the same reasons stated above with respect to claim 1, independent claims 9 and 17 are not rendered obvious by Ying et al. in view of the APA. Therefore, claims 9 and 17 are patentable and should be allowed.

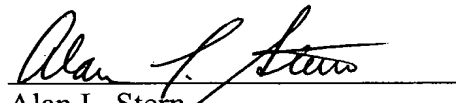
Though dependent claims 11-16 and 18-20 contain their own allowable subject matter, these claims should at least be allowable due to their dependence from allowable claims 9 and 17, respectively.

S.N.: 10/781,268  
Art Unit: 2622

### **CONCLUSION**

The Examiner is respectfully requested to reconsider and remove the rejections of claims 1, 3-9 and 11-20 and to allow all of the pending claims as now presented for examination. For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record. Should any unresolved issue remain, the Examiner is invited to call Applicants' agent at the telephone number indicated below.

Respectfully submitted:



Alan L. Stern  
Reg. No.: 59,071

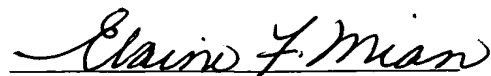
2/01/2008  
Date

Customer No.: 29683

HARRINGTON & SMITH, PC  
4 Research Drive  
Shelton, CT 06484-6212  
Telephone: (203) 925-9400 ext. 18  
Facsimile: (203) 944-0245  
E-mail: astern@hspatent.com

### **CERTIFICATE OF MAILING**

I hereby certify that this correspondence, a Response to the Office Action mailed on November 1, 2007, is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.



Name of Person Making Deposit

2/1/2008  
Date